A FILTER FOR LIQUIDS

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(54) A filter for liquids

(57) A water filter for drinking water supplies has a casing (1), a water inlet (2), a central throughflow channel (3), a filter insert (4) surrounding the throughflow channel and a water outlet (5) disposed in the casing floor (6) and common to the throughflow channel and the filter insert, control means (7) inserted into the throughflow channel (3) to divert the water stream through the filter insert (4), and setting means (8) which switch the control means (7) from the throughflow setting to the filtration setting and vice versa, while in order to monitor the efficiency of the filter insert (4), provision is made that when the setting means (8) switch the control means (7) into the filtration setting they also switch on an optical or acoustic indicator (10) powered by an electrical energy store (9), the stored

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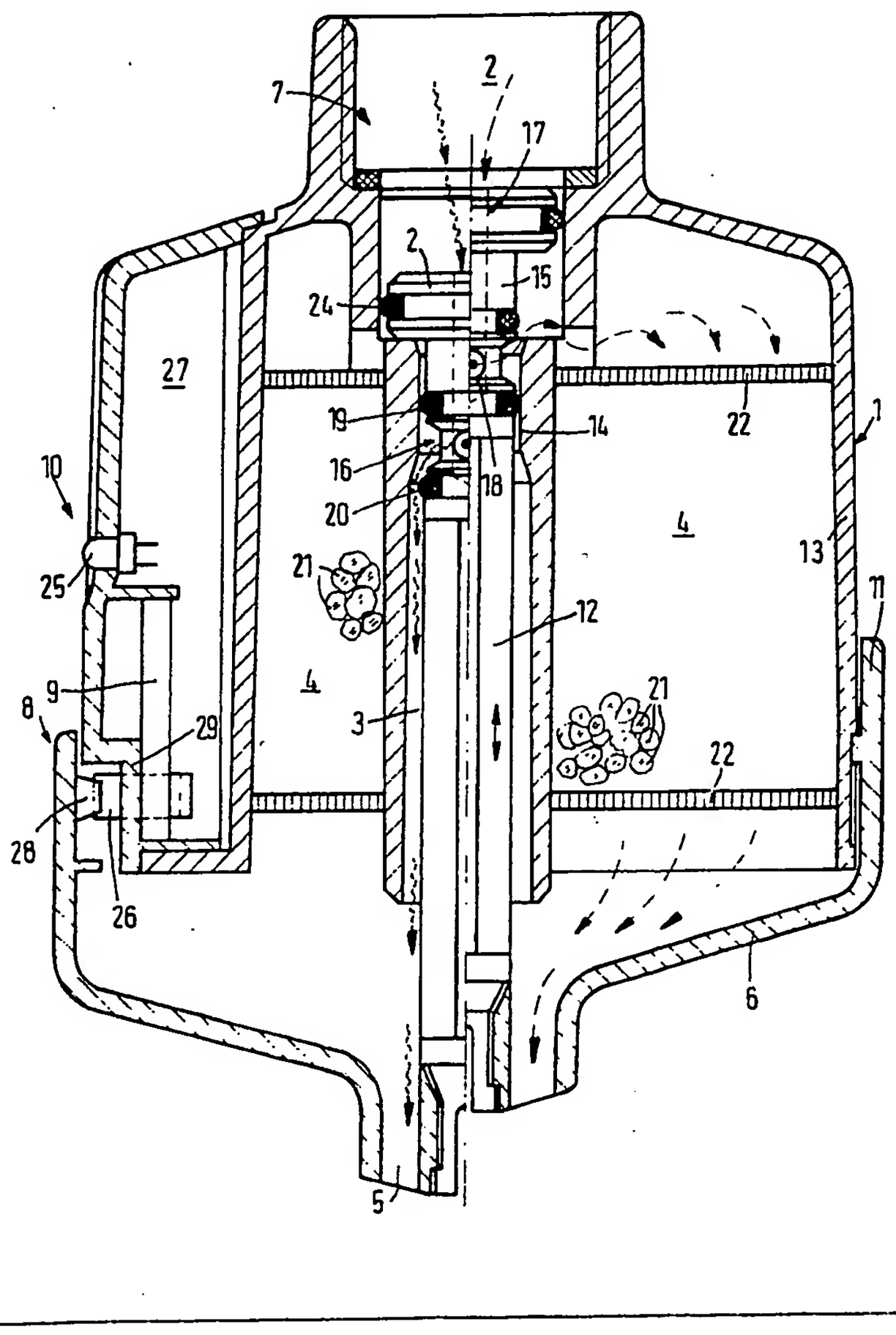
Fig.1



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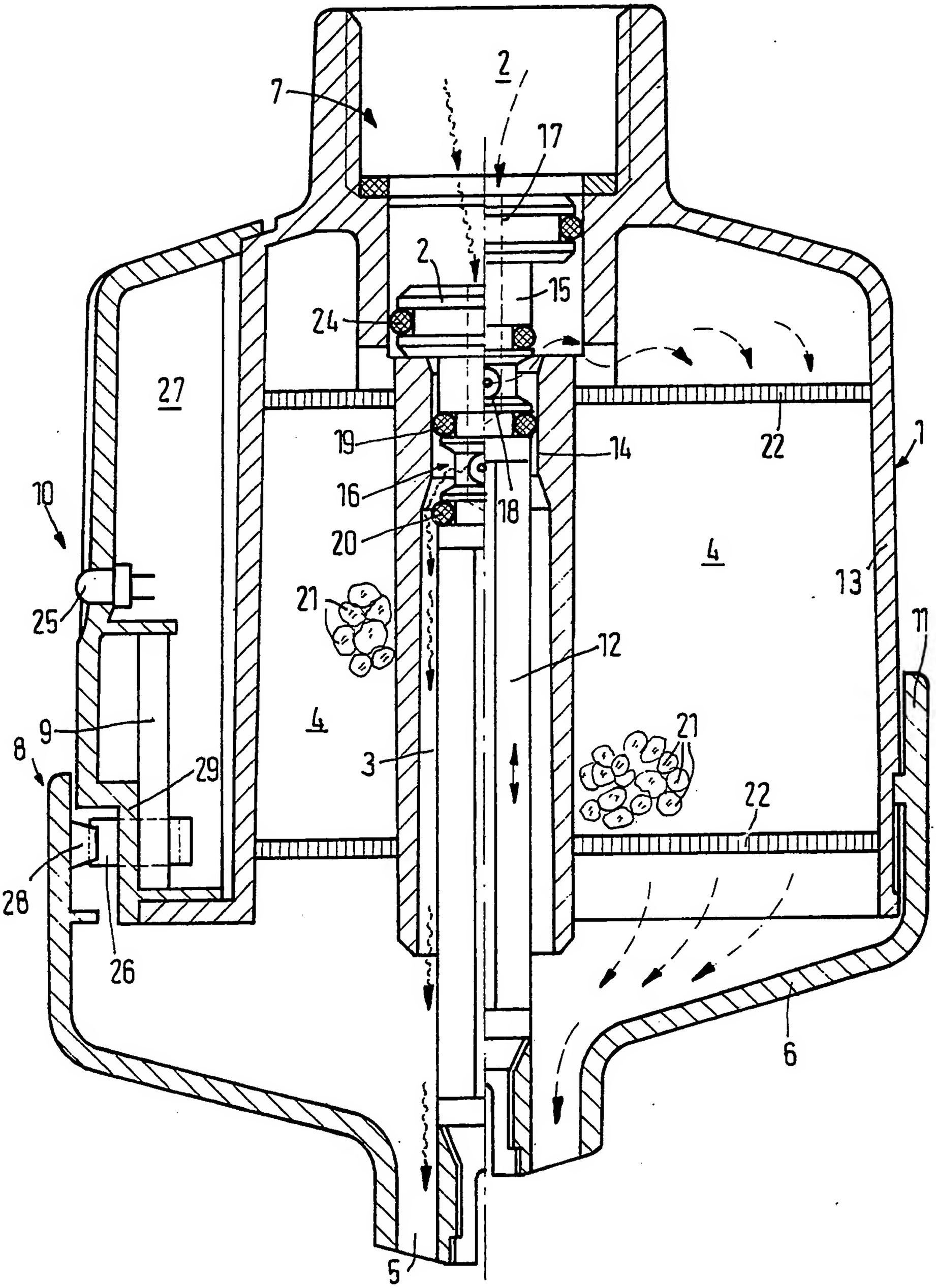
energy of which corresponds to a prescribed volume of water passed through the filter, so that when the stored energy is consumed, the indicator (10) fails to respond even though water is still flowing through the filter insert (4).

Fig.1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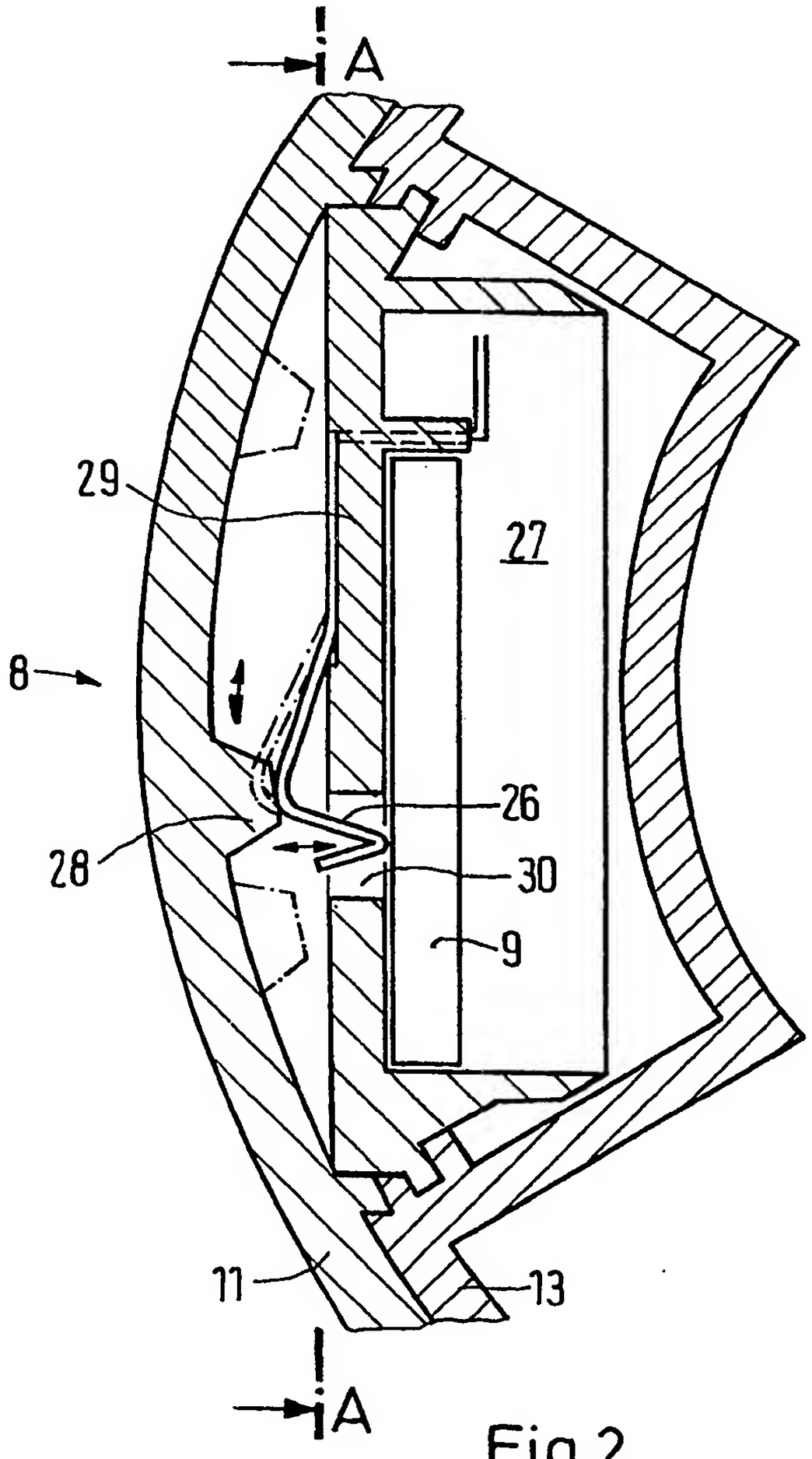

Fig.2

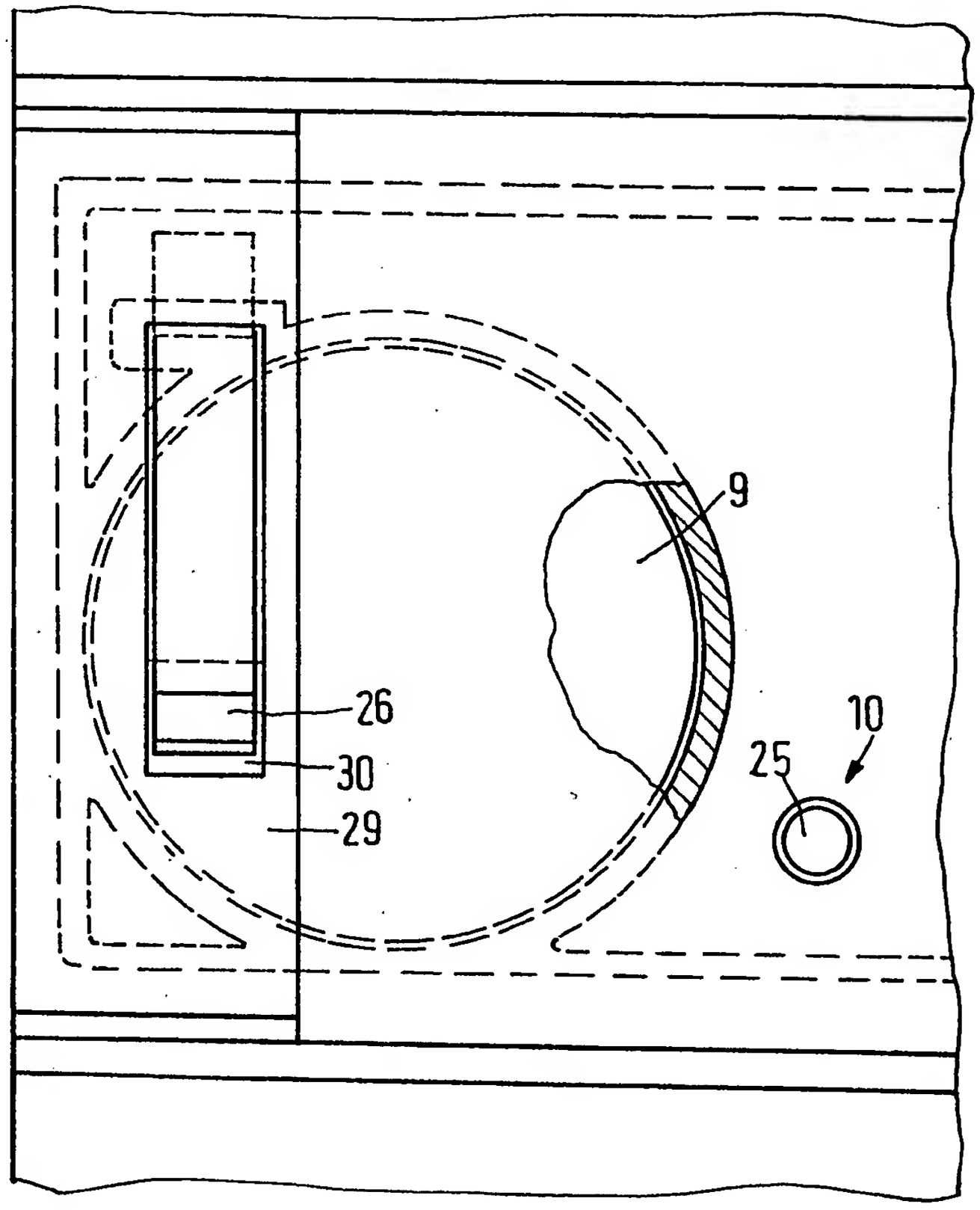

Fig.3

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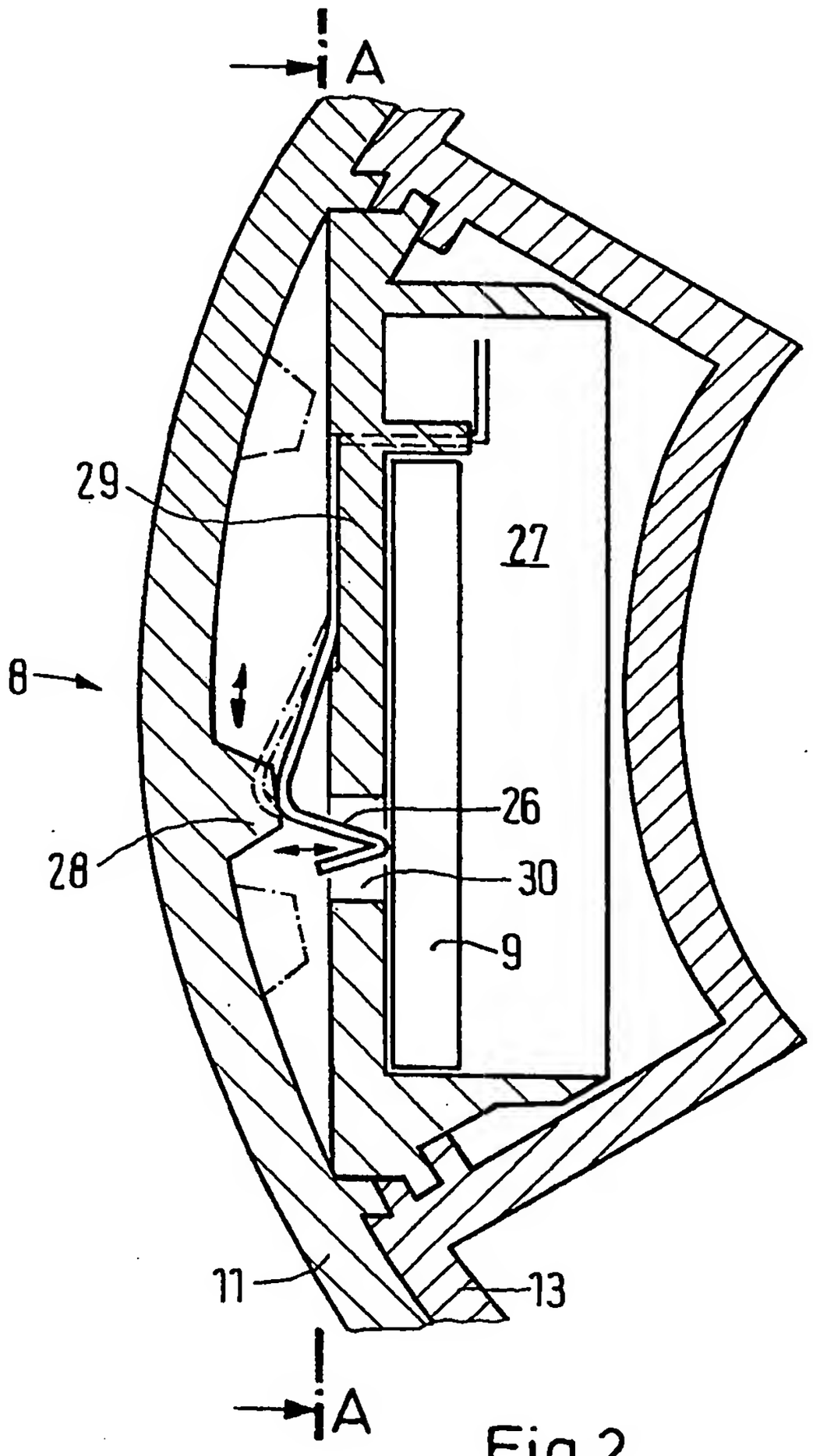

Fig.2

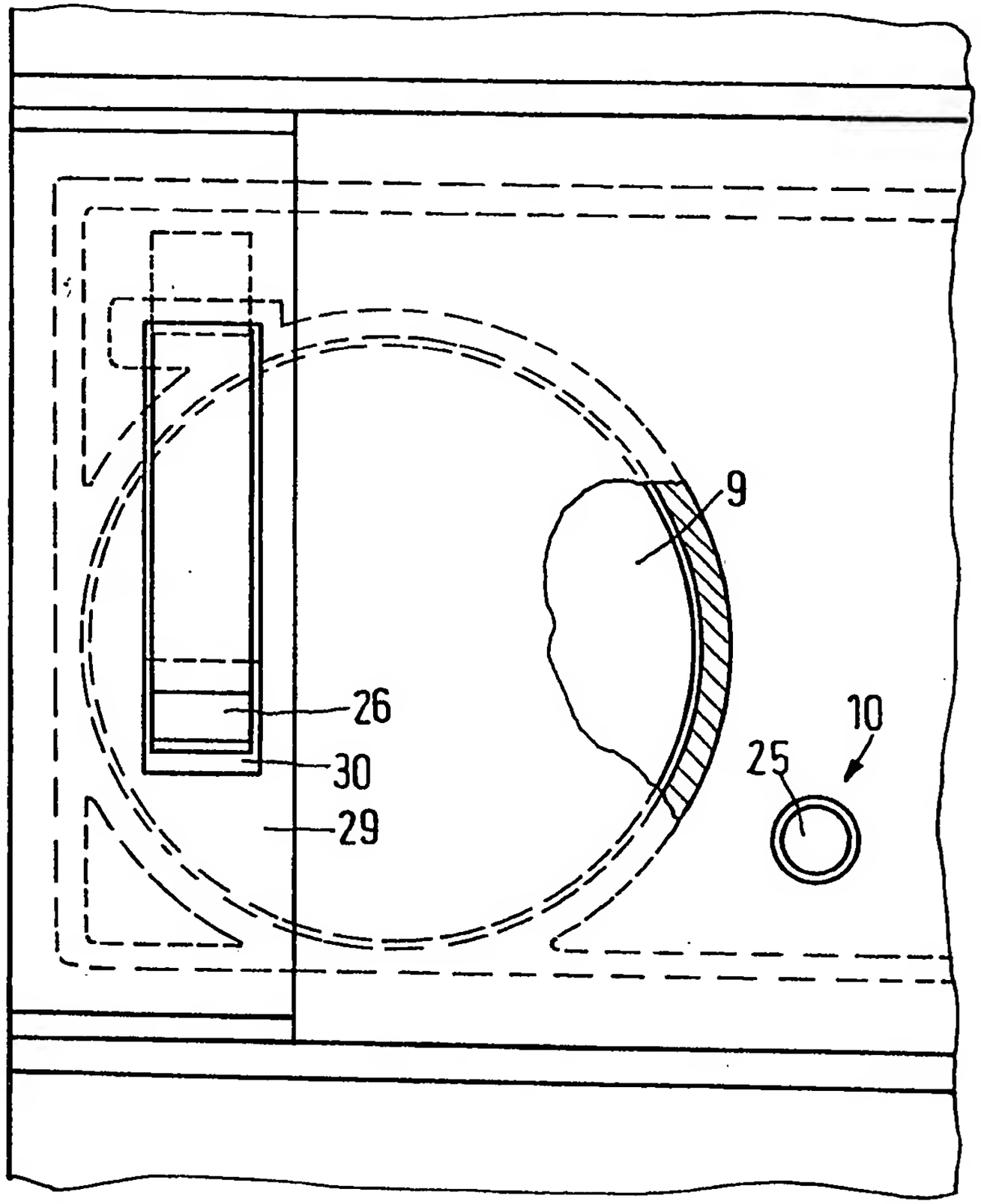

Fig.3

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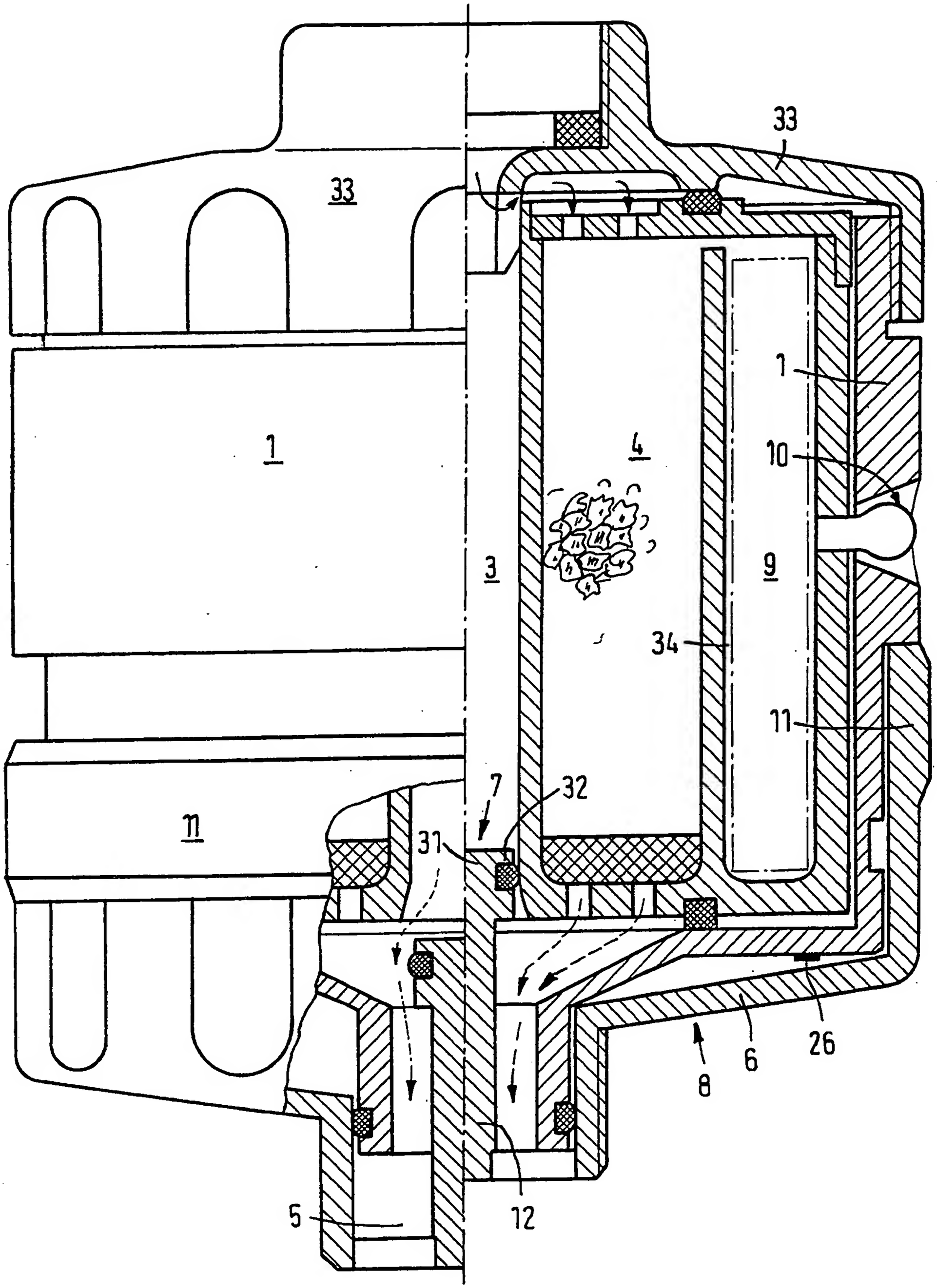
Fig.4



SPECIFICATION

A filter for liquid

This invention relates to a filter for liquids, more particularly a water filter for drinking water supplies, having a casing, a water inlet, a central throughflow channel, a filter insert surrounding the throughflow channel and a water outlet disposed in the casing and common to the throughflow channel and the filter insert, control means inserted into the throughflow channel to divert the water stream through the filter insert, and setting means which switch the control means from the throughflow setting to the filtration setting and vice versa.

There are known water filters for drinking water supplies, which are used mainly for the dechlorination and sterilization of drinking water and accordingly have a suitable filter insert of active carbon for example. However, the known embodiments are not entirely satisfactory in that they cannot detect saturation with harmful substances. Consequently there is no guarantee that such filters will not be kept in service after they have become exhausted and can no longer sterilise and dechlorinate the drinking water satisfactorily. The invention is intended to remedy this situation.

The object of the invention is to provide a filter for liquids, more particularly a water filter for drinking water supplies, of the type initially described, which provides a monitoring of the efficiency of the filter insert yet is nevertheless characterised by a relatively simple and functionally reliable construction.

According to the present invention, a filter of the type in question is characterised in that when the setting means switch the control means into the filtration setting they also switch on an optical or acoustic indicator powered by an electrical energy store, the stored energy of which corresponds to a prescribed volume of water passed through the filter.

The invention is based on the discovery that an electrical energy store for an optical or acoustic indicator can be adapted so that its discharge period corresponds to a specified volume of water passed through the filter, for example a water throughput of 1000 litres. Care must also be taken that the indicator is always but only switched on when water is taken from the filter, so that the discharging of the electrical energy store is truly related to the water throughput. Consequently, the optical or acoustic indicator in the water filter of the invention is automatically and invariably switched on when water is passing through the filter insert and being purified and removed. As soon as the indicator no longer emits an optical or acoustic signal, though it is switched on and water is being removed, saturation with harmful substances has been reached and either the entire water filter or its filter insert must be replaced. In this way, the water filter of the invention easily provides a satisfactory monitoring of the efficiency of the filter insert. The means provided for this purpose are relatively simple from the constructional and functional viewpoints.

Further preferred features of the invention will now be described. Thus, the setting means may incorporate a vertically adjustable floor for the casing, a guide collar surrounding the casing and a setting member attached to the floor, running coaxially up the tubular throughflow channel and actuating the control means disposed at the top end of the tube. Thus the simple vertical movement of the floor operates the setting member and through it the control means, which are switched from the throughflow setting to the filtration setting or vice versa. As the floor moves vertically, the indicator is simultaneously switched on or off. One embodiment of the invention of independent significance is characterised in that the control means have a control bush attached to the setting member, guided in a constricted section of the throughflow tube and having an annular groove, a blind axial hole and a radial transverse hole, the annular groove being bounded by at least one upper sealing ring and one lower sealing ring, while the distance between the two sealing rings is adjusted so that when the upper sealing ring lies inside the constricted tube section the lower sealing ring is exposed and the water flowing through the control bush and out of the tranverse hole escapes by the annular groove into the tube, whereas when the lower sealing ring lies inside the constricted tube section the upper sealing ring is exposed and the water flowing out of the transverse hole is deflected over the annular groove and the top end of the tube, to enter the filter insert. The filter insert lies in the annular space bounded by the throughflow channel or tube and the walls of the casing. The simple vertical movement of the control bush transfers it between the throughflow and filtration settings and thereby ensures that the water will flow either directly through the tube without switching on the indicator or round through the filter insert, in which case the indicator is switched on. Preferably, the top end of the control bush, which is attached at its bottom end to the setting member of the setting means, is additionally guided in the water inlet with the interposition of at least one sealing ring.

The optical indicator, its light source, its energy store and a switch are all preferably accommodated in a peripheral chamber of the casing, and the guide collar on the setting means moves the switch into its upper position, while the setting member raises the control bush into the filtration setting. The indicator preferably has a diode situated on the casing wall as a light source and a battery as an energy store, while the guide collar acts through an actuating cam on the switch, which takes the form of a spring member with associated contacts, and which completes the circuit from the battery through intermediate resistors to the diode.

An embodiment of the invention and a modification thereof will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is an axial section through a water filter of the invention, shown in the throughflow setting on the left and the filtration setting on the right;

Figure 2 is a partial horizontal section of the area around the indicator in the filter of Figure 1;

Figure 3 is a vertical section, taken on the line A-A of Figure 2; and

Figure 4 is a part-sectional elevation through a modified form of the filter of Figure 1, shown in the throughflow setting on the left and the filtration setting on the right.

Figures 1 to 3, show a filter for liquids, more particularly a water filter for drinking water supplies. This water filter consists basically of a casing 1, a water inlet 2, a central throughflow channel 3, a filter insert 4 surrounding the throughflow channel and a water outlet 5 in the casing floor 6, common to the throughflow channel 3 and the filter insert 4. Control means 7 are inserted into the throughflow channel 3 to divert the water stream through the filter insert 4. The control means 7 are actuated by setting means 8 which switch the control means 7 from the throughflow setting to the filtration setting and vice versa. When the setting means 8 switch the control means 7 into the filtration setting, they also switch on an optical or acoustic indicator 10 powered by an electrical energy store 9. The stored energy corresponds to a prescribed volume of water passed through the filter. When the indicator 10 is switched on but is no longer operating because there is no more energy, it denotes saturation with harmful substances and accordingly the water filter or its filter insert 4 must be replaced. The setting means 8 incorporate a vertically adjustable floor 6 for the casing 1, a guide collar 11 surrounding the casing 1 and a setting member 12 attached to the floor 6, running coaxially up the tube 3 constituting the throughflow channel and actuating the control means 7 disposed at the top end of the tube. The vertical movement of the floor 6 can easily be brought about with the aid of a bayonet fitting or inclined planes betweeen the casing walls 13 and the guide collar 11. The setting member 12 may take the form of a round or cruciform-section rod, but its cross-section must in all cases be less than that of the channel or tube, so that the setting member 12 does not interfere with the water stream. The control means 7 have a control bush 15 attached to the setting member 12, guided in a constricted section 14 of the throughflow channel 3 and having an annular groove 16, a blind axial hole 17 and a radial transverse hole 18, the annular groove 16 being bounded by an upper sealing ring 19 and a lower sealing ring 20, while the distance between the two sealing rings 19 and 20 is adjusted so that when the upper sealing ring 19 lies inside the constricted tube section 14 the lower sealing ring 20 is exposed and the water flowing through the control bush 15 and out of the tranverse hole 18 escapes by the annular groove 16 into the tube 3. When the lower sealing ring 20 lies inside the constricted tube section the upper sealing ring 19 is exposed and water flowing out of the transverse hole is deflected over the annular groove 16 and the top end of the tube 3, to enter the filter insert 4 lying in the annular space bounded by the tube 3 and the casing walls 13. In the former case the control bush 15 takes up its throughflow setting, and in the latter case its filtration setting. Broken arrows of differing patterns indicate the water paths in the two settings. The filter insert 4 consists substantially of filter carbon 21, protected by upper and lower gauze rings 22. The top end 23 of the control bush 15, which is attached at its bottom end to the setting member 12 of the setting means 8, is additionally guided in the water inlet 2 with the interposition of at least one sealing ring 24. The optical indicator 10 in the embodiment shown, with its light source 25, its energy store 9 and a switch 26, are all accommodated in a peripheral chamber 27 of the filter casing 1. The guide collar 11 on the setting means 8 moves the switch 26 into its upper position, while the setting member 12 raises the control bush 15 into the filtration setting. Thus a vertical movement of the guide collar 11 simultaneously raises or lowers the casing floor 6 and the setting member 12 attached thereto. The indicator 10 has a diode or bulb 25 in a protected position in the casing wall 13 forming a light source 25 and a battery forming the energy store 9, while the guide collar 11 acts through an actuating cam 28 on the switch 26, which takes the form of a spring member with associated contacts, and which completes the circuit (not detailed) from the battery to the diode. A bayonet fitting is provided for the vertically movable guide collar 11, so that as the collar is moved vertically the actuating cam 28 associated with the spring member describes as it were a helical sweep and the spring member is either transferred to the on position or released so that it can simply spring back to the off position. Moreover, the chamber 27 accommodating the indicator 10 has a cover 29 in which the spring member is swivellably mounted and can be urged through a gap 30 directly against the battery or the contact element to switch on the indicator 10.

The modified embodiment shown in Figure 4, and which is of independent significance, is characterised in that the setting member 12 attached to the vertically movable casing floor 6 is integrated with the control means 7 to form a single unit and the control means 7 takes the form of a control piston 31 which can be driven into and out of the throughflow channel 3 and has at least one circumferential sealing ring 32. When the control piston 31 is brought out of the throughflow channel 3, the water filter of the invention assumes its throughflow setting, whereas when the control piston 31 is driven into the throughflow channel, the water filter of the invention assumes its filtration setting. The filter unit 4 is inserted replaceably into the casing 1, which has a removable coverplate 33. In this case, moreover, the filter insert 4 forms the throughflow channel 3 and has a chamber 34 for the energy store 9 and the associated electronics.

CLAIMS

1. A filter for liquids having a casing, a water inlet, a central throughflow channel, a filter insert surrounding the throughflow channel and a water outlet disposed in the casing floor and common to the throughflow channel and the filter insert, control means inserted into the throughflow channel to divert the water stream through the filter insert, setting means which switch the control means from the throughflow setting to the filtration setting and

vice versa, and when the setting means switch the control means into the filtration setting they also switch on an optical or acoustic indicator powered by an electrical energy store, the stored energy of which corresponds to a prescribed volume of water passed through the filter.

2. A filter as in Claim 1, wherein the setting means incorporate a vertically adjustable casing floor, a guide collar surrounding the casing and a setting member attached to the floor, running coaxially up the tubular throughflow channel and actuating the control means disposed at the top end of the tube.

3. A device as in Claim 1 or Claim 2, wherein the control means have a control bush attached to the setting member, guided in a constricted section of the throughflow channel and having an annular groove, a blind axial hole and a radial transverse hole, the annular groove being bounded by at least one upper sealing ring and at least one lower sealing ring, while the distance between the two sealing rings is adjusted so that when the upper sealing ring lies inside the constricted tube section the lower sealing ring is exposed and the water flowing through the control bush and out of the transverse hole escapes by the annular groove into the tube, whereas when the lower sealing ring lies inside the constricted tube section the upper sealing ring is exposed and the water flowing out of the transverse hole is deflected over the annular groove and the top end of the tube, to enter the filter insert.

4. A filter as in any one of Claims 1 to 3, wherein the top end of the control bush is guided in the water inlet with the interposition of at least one sealing ring.

5. A filter as in any one of Claims 1 to 4, wherein the optical indicator, its light source, its energy store and a switch are all accommodated in a peripheral chamber of the filter casing, and the guide collar on the setting means moves the switch into its upper position, while the setting member raises the control bush into the filtration setting.

6. A filter as in any one of Claims 1 to 5, wherein the indicator has a diode situated on the casing wall forming a light source and a battery forms the energy store, while the guide collar acts through an actuating cam on the switch, which takes the form of a spring member with associated contacts, and which completes the circuit from the battery to the diode.

7. A filter as in Claim 1, wherein the setting member attached to the vertically movable casing floor is integrated with the control means to form a single unit, and the control means takes the form of a control piston which can be driven into and out of the throughflow channel and has at least one circumferential sealing ring.

8. A filter as in Claim 1 or Claim 7, wherein the filter unit is inserted replaceably into the casing, which has a removable coverplate, and the filter insert forms the throughflow channel and has a chamber for the energy store.

9. A filter for liquids substantially as hereinbefore described with reference to Figures 1 to 3 or as modified in Figure 4 of the accompanying drawings.

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